

TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE

WYOMING

SOIL CONSERVATION SERVICE

BIOLOGY-WY-33

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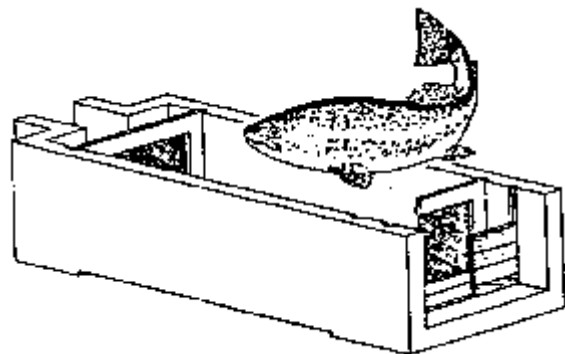
AQUACULTURE RESOURCE ASSESSMENT GUIDE

This guide provides planners with a systematic procedure for objectively evaluating the potential for aquaculture on individual farm units. The guide identifies the most significant resource requirements for successful aquaculture and provides documentation for vital resource data. Upon completion, these data can be used for determination of aquaculture resource potentials and alternatives.

Determining resource potentials for aquaculture requires accurate identification of problems, limitations, and opportunities. For this reason, the data collected should be the most factual and up-to-date information available. SCS standards and specifications for aquaculture related practices can aid in the determination of resource potentials.

The resource factors included in the guide are generally listed in descending order of significance of relative dependency. Collecting the most critical information first allows the assessment process to be terminated upon the first appearance of an insurmountable resource limitation. Simultaneous collection and analysis of resource data will save time and avoid the need of gathering unnecessary information. Preliminary assessment information can be assembled prior to a planning conference with the cooperator.

The Aquaculture Resource Assessment Guide provides a statewide standard method to insure that major resource requirements are considered in the planning and application of aquaculture enterprises. Once completed, it can be maintained in the case file as a valuable source of information for future reference.



Aquaculture Resource Assessment Guide

Soil Conservation Service

Wyoming

I. Case File Information

- A. Cooperator's Name _____
- B. Case File Index Code _____
- C. Address and Telephone _____

- D. Location of Operating Unit _____
- E. Type of Aquaculture Developing Being Considered (Landowner Expectations or Objectives)
1. Aquaculture Species to be Cultured
- | | |
|--------------------------|--------------------------------|
| a. Rainbow trout _____ | e. other trout _____
(name) |
| b. Brown trout _____ | f. Catfish _____ |
| c. Brook trout _____ | g. Bass-bluegill _____ |
| d. Cutthroat trout _____ | h. other fish _____
(name) |
2. Life Stages to be Cultured
- | | |
|----------------------|---------------------------|
| a. Eggs _____ | c. Market size fish _____ |
| b. Fingerlings _____ | d. Brood stock _____ |
| e. Other _____ | |
3. Production System:
- | | |
|----------------|----------------|
| Ponds _____ | Hatchery _____ |
| Raceways _____ | Other _____ |
4. Expected System Size (acres, cfs, linear ft., raceway) _____
5. Expected level of Production (lb/acre, lbs/cfs) _____
6. Intended Use (Identify the market) _____

REMARKS: Statement of land user objectives which includes preferred species, culture methods, short and long range goals, total production, etc.

II. Critical Resources

*A. Land Under Proposed Water Area

1. Soil (physical and chemical properties)
 - *a. Permeability _____
 - b. Erodibility _____
 - c. Piping potential _____
 - d. Compactability _____
 - e. Seasonal high water table _____
 - f. Soil reaction

 - g. Corrosiveness _____
 - h. Shrink-swell potential _____
 - i. Depth to bedrock _____
 - j. Distance to suitable clay core material _____
 - k. Fertility _____
2. Site Conditions
 - a. Topography (suitability for intended use) _____

 - *b. Protection from floods (historic high water mark) _____

 - *c. Proximity to water source _____

 - *d. Adequacy of discharge outlets _____

 - e. Rights of way restrictions (utilities) _____

 - f. Compliance with state or federal land use regulations (permit requirements):
 - (1) Dam safety _____
 - (2) Section 404 permits (Clean Water Act) _____

* Denotes most critical resources

g. Limitations caused by previous use (toxic substances)

h. Expansion opportunities _____

i. Availability of year round access _____

j. Sensitivity to adjacent property

*(1) Agricultural crops requiring pesticide
treatment _____

(2) Compatibility with urban areas, scenic quality,
theft, potential, etc _____

*(3) Power supply

(a) Electric service available

single phase _____ distance _____

three phase _____ distance _____

(b) Availability of emergency generation

equipment _____

(c) Other _____

REMARKS:

*B. Water

1. Source of Supply (Check single or combination of sources if
supply is to be mixed.)

		<u>Present</u>	<u>Potential</u>
a.	Groundwater-well	_____	_____
b.	Groundwater-spring	_____	_____
c.	Stream	_____	_____
d.	Pond/reservoir	_____	_____
e.	Runoff	_____	_____
		<u>Present</u>	<u>Potential</u>
3.	Water Quantity (Amount available by Source)		
a.	Surface acres	_____	_____
b.	Acre-feet/year (Storage Reservoirs)	_____	_____
c.	Gallons per minute, cubic Feet per second	_____	_____
d.	Water budget per unit time		
	(1) Precipitation (inches/yr., runoff)	_____	_____
	(2) Storage potential (acre ft.)	_____	_____
	(3) Evaporation loss (volume/unit time)	_____	_____
	(4) Seepage loss (volume/unit time)	_____	_____
	(5) Controlled water additions (volume/unit time from well, springs, etc.)	_____	_____
e.	Supply access		
	(1) Pumping	_____	_____
	(2) Gravity flow	_____	_____
	(3) Artesian	_____	_____
	(4) relative cost per water unit (feasibility, \$)	_____	_____

REMARKS: _____

*3. Water Quality (data necessary from each source)

a. Physical properties

(1) Temperature (seasonal range) _____

(2) Species - growing season relationships

(a) Growing season dependent upon:

seasonal climate____solar heating system_

geothermal wells____large reservoir_____

coldwater springs____single level supply__

heated discharge____multilevel supply_____

coldwater wells_____

(b) Growing season length** (growing season
by location)

<u>Species</u>	<u>Water Temp</u> <u>Range</u> °F _____	<u>Potential</u> <u>No. of days</u>	<u>Biological</u> <u>Requirement</u>
Rainbow, Cutthroat, Brown, Brook Trout			
Production Facility	50°-68°	_____	_____
Hatchery	45°-58°	_____	180 days
Channel Catfish			
Production Facility	60°-90°	_____	_____
Hatchery	70°-85°	_____	60 days
Largemouth Bass			
Production Facility	60°-85°	_____	_____
Hatchery	70°-85°	_____	60 days
Bluegill Sunfish			
Production Facility	60°-85°	_____	_____
Hatchery	80°-85°	_____	90 days
Tilapia			
Production Facility	60°-90°	_____	_____
Hatchery	70°-75°	_____	180 days
Other	_____	_____	_____

(3) Turbidity _____

** See References on Climate

b. Chemical properties (water analysis is required)

*(1) Dissolved oxygen (ppm) _____

*(2) pH _____

(3) Carbon Dioxide (ppm) _____

*(4) Alkalinity (mg/L) _____

(5) Hardness (mg/L) _____

(6) Specific conductance _____

*(7) Metals (ppm) _____

c. Actions required to meet species needs

(1) Aeration _____

(2) Liming _____

(3) Other _____

REMARKS:

4. Limitations of Water Use

*a. Pollution:

Present _____ Potential _____

b. Lack of emergency supply _____

c. Competition for water use by others _____

*d. Regulatory restrictions

(1) Water withdrawal regulations _____

(2) Discharge regulations (NPDES Permits) _____

(3) Exotic or transplanted species _____

(4) Water use restrictions _____

d. Wild fish/parasites/disease _____

REMARKS:

III. Economic Considerations

A. Production Capabilities

1. Estimated Units of Production - surface acres, cfs _____

2. Stocking Rates - no./acre, no./cfs _____

3. Estimated Annual Production per Unit (lbs) _____

4. Estimated Total Annual Production (lbs) _____

*5. Production Sequence - the amount of production available
for market on a weekly, monthly, quarterly, or annual basis

B. Marketing Opportunities

		Presently Available	Potentially Available
1.	Processing Plants	_____	_____
	a. Maximum haul distance _____		
	b. Minimum purchase requirements _____		
	c. Processing by Cooperator _____		
2.	Live-haulers	_____	_____
	a. Live-haul distance _____		
	b. Minimum purchase requirements _____		
3.	Local Demand (direct sale)	_____	_____
	a. Dependability of Market _____		
	b. Average Weekly Market Demand (Marketing survey by Cooperator) _____		
4.	Fee Fishing	_____	_____
	a. Customer Potential (size and distance to population center can be used as an index _____)		
	b. Convenience of access _____		
	b. Other _____		
5.	Alternative Marketing Strategy	_____	_____
C.	Supplying the Market		
1.	Harvesting Methods		
	a. Partial harvest _____		
	b. Total harvest _____		

2. Transportation and Handling Methods _____

3. Distance to Market _____

REMARKS: _____

D. Annual Operating Cost Considerations (estimates based on local cost)

*1. Feed/fertilizer _____

*2. Seed stock

a. eggs _____ c. fingerlings _____

b. fry _____ d. catchables _____

NOTE: As a rule of thumb, feed and fingerling cost may represent as much as 60% of annual operating expenses.

3. Labor (family or hired)

Cost

Availability

a. Management _____

b. Hired Labor _____

4. Energy (gas, diesel, electricity)

a. Pumping _____ c. Feeding _____ Processing _____

b. Aeration _____ d. Harvest and transportation _____

5. Repairs and Maintenance

a. Ponds _____ d. Disease, parasite and weed control equipment

b. Water supply _____ e. Harvesting equipment _____

c. Feeding equipment f. Miscellaneous _____

6. Interest on Operating Capital _____

7. Chemicals _____

8. Diagnostic Fees _____

E. Annual Ownership Cost Considerations

1. Investment Cost and/or Depreciation

- *a. Land _____
- *b. Facilities Construction:
 - (1) Earth moving _____
 - (2) Water control structures _____
 - (3) Gravel _____
 - (4) Vegetative cover _____
- *c. Water supply _____
- d. Feeding Equipment
 - (1) Feeder _____
 - (2) Bulk storage _____
- e. Harvesting Equipment
 - (1) Seines/reels _____
 - (2) Live-cars _____
 - (3) Holding vats _____
 - (4) Fish pumps _____
 - (5) Other _____
- f. Disease, parasite, and weed control equipment _____
- g. Taxes and insurance _____
- h. Miscellaneous

(1) Truck _____	(6) Waders _____
(2) Tractor _____	(7) Boat, motor _____
(3) Service building _____	(8) Aerator _____
(4) Farm Shop equipment _____	(9) Storage buildings and office space _____
(5) Re-lift pump _____	(10) Other _____

- IV. Landuser or-Operator's Previous Experience in Aquaculture or Related Field (Narrative Discussing Important Points of Experience Applicable to Current Objectives)

- V. General Assessment Summary

Selected References

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GLOSSARY

Alkalinity - The total concentration of bases, primarily carbonate and bicarbonate ions, expressed as mg/L of equivalent calcium carbonate.

Artesian - Refers to a free flowing bored well in which water rises to the surface under pressure.

Carbon Dioxide - Atmospheric gas, used during photosynthesis by plants and released by respiration, decomposition, or combustion.

Catchables - Fish of suitable size to be harvested by fishing.

Coldwater - Refers to temperature range of about 33°-70° F, as the desirable range for certain species of fish.

Compactibility - The ease or potential to be joined or packed together into a dense, consolidated material with less air or cold space than before.

Corrosiveness - The degree that a material, usually metal, is likely to deteriorate because of a reaction with its environment.

Customer Potential - Size of and distance to population centers are factors related to probability of success of fee fishing as a market alternative.

Dissolved Oxygen - The elemental oxygen gas contained in a body of water and available for the life support of fish and other organisms.

Erodibility - The rate or potential for wearing away of land surface by water, wind, ice, or other agents and by processes such as gravitational creep.

Exotic - Not native to United States; of foreign origin.

Fingerlings - Immature fish, larger than fry but not yet of cacheable or edible size.

Fry - Small, recently hatched fish that have begun feeding activities.

Geothermal - Refers to heat from the earth.

Hardness - Refers to the concentration of divalent metallic ions, primarily calcium and magnesium, in the water expressed as calcium carbonate equivalent.

Live Car - A floating net enclosure used for holding live fish during harvest operations.

Live Hauler - A transporter or hauler of live fish.

Metals - Elements yielding positively charged ions in aqueous solutions of their salts.

NPDES - National Pollutant Discharge Elimination System.

Partial Harvest - The periodic removal of a part of a crop of fish, usually the larger ones, leaving the smaller ones for further growth and later harvest.

Permeability - Quality of soil that enables water to move downward through the profile, generally expressed as inches per hour.

pH - A measure of the hydrogen ion concentration and indicates whether the water is acidic or basic in reaction.

Piping Potential - The likelihood that subsurface tunnels or pipelike cavities will form by water moving through the soil.

Raceways - Fish production units with continuous exchange of water; units may be concrete or earthen.

Seed Stock - Fish or fish eggs used in stocking ponds or other bodies of water.

Shrink-Swell Potential - Susceptibility to volume change due to loss or gain in moisture content.

Single Phase - Refers to an electrical circuit having an alternating current with one phase, or with phases differing by 180°, suitable for electric motors up to 5-7.5 horsepower.

Soil Reaction - Refers to hydrogen ion concentration of water solution of soil sample.

Specific Conductance - Refers to conductivity or a measure of the ability of natural water to convey an electrical current.

Three Phase - Refers to a circuit, system or device that is energized by three electromotive forces differing in phase by one-third of a cycle or 120°; usually required for electric motors of 5-7.5 horsepower or greater.

Total Harvest - The removal of the total crop of fish from a pond or other production unit.

Transplanted - Refers to fish that were transferred from one watershed to another within the same country.

Turbidity - Refers to mud particles or microscopic aquatic plants and animals (plankton) suspended in water.

Wild Fish - Refers to fish that were not purposefully stocked, but entered through the water supply or by other means.